

Appl. No. 09/274,194

Request for Reconsideration: dated January 27, 2004

Reply to Final Office Action of September 30, 2003

Please amend the claims as follows. This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

Claims 1-19 (previously cancelled)

Claim 20 (previously added): A method of removing photoresist material from surfaces formed on a semiconductor substrate, comprising:

providing a semiconductor substrate;

forming a low dielectric constant layer on a surface of the semiconductor substrate;

forming a hard mask layer over the low dielectric constant layer;

forming a photoresist layer over the hard mask layer;

forming an opening in the hard mask layer exposing the low dielectric constant layer;

and

removing the photoresist layer from over the hard mask layer with dimethyl sulfoxide of a high pressure liquid chromatography (HPLC) grade,

wherein a high selectivity of the dimethyl sulfoxide of HPLC grade toward a low dielectric constant material of the low dielectric constant layer causes the dimethyl sulfoxide of the HPLC grade to chemically dissolve the photoresist layer from over the hard mask layer without substantially damaging the low dielectric constant layer.

Claim 21 (previously added): The method of claim 20, wherein the low dielectric constant material has a dielectric constant of about 3.0 or less.

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Claim 22 (previously added): The method of claim 20, wherein the low dielectric constant material has a dielectric constant in a range from approximately about 1.5 to approximately about 3.0.

Claim 23 (previously added): The method of claim 20, wherein the semiconductor substrate is held in an ultrasonic bath.

Claim 24 (previously added): The method of claim 23, wherein the ultrasonic bath is heated to at least approximately about 50 °C.

Claim 25 (previously added): The method of claim 24, wherein the semiconductor substrate is held in the ultrasonic bath for a period not longer than about 5 minutes.

Claim 26 (previously added): A method of removing photoresist material, comprising:

- providing a semiconductor substrate;
- forming a low dielectric constant layer on a surface of the semiconductor substrate;
- forming a hard mask layer over the low dielectric constant layer;
- forming a photoresist layer over the hard mask layer;
- forming an opening in the hard mask layer using the photoresist layer; and
- removing the photoresist layer from over the hard mask layer using dimethyl sulfoxide, the dimethyl sulfoxide having high selectivity to the low dielectric constant layer such that the dimethyl sulfoxide chemically dissolves the photoresist without damaging the low dielectric constant layer exposed by the opening.

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Claim 27 (previously added): The method of claim 26, wherein the photoresist layer is removed by subjecting the semiconductor substrate to dimethyl sulfoxide in liquid form.

Claim 28 (previously added): The method of claim 27, wherein the photoresist layer is removed by subjecting the semiconductor substrate to dimethyl sulfoxide of a high pressure liquid chromatography (HPLC) grade.

Claim 29 (previously added): The method of claim 26, wherein the semiconductor substrate is held in an ultrasonic bath.

Claim 30 (previously added): The method of claim 29, wherein the ultrasonic bath is heated to at least approximately about 50 °C.

Claim 31 (previously added): The method of claim 30, wherein the semiconductor substrate is held in the ultrasonic bath for a period not longer than about 5 minutes.

Claim 32 (previously added): The method of claim 26, wherein the low dielectric constant layer has a dielectric constant of approximately about 3.0 or less.

Claim 33 (previously added): The method of claim 26, wherein the low dielectric constant layer has a dielectric constant in a range from approximately about 1.5 to approximately about 3.0.

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Claim 34 (previously added): A method of forming a semiconductor device, comprising:

forming a low dielectric constant layer;
forming a hard mask layer over the low dielectric constant layer;
forming a photoresist layer over the hard mask layer;
patterning the photoresist layer;
etching an opening in the hard mask layer using the patterned photoresist layer; and
removing the photoresist layer from over the hard mask layer with a high pressure liquid chromatography (HPLC) grade liquid held in an ultrasonic bath, the HPLC grade liquid having high selectivity toward the low dielectric constant layer thus dissolving the photoresist layer from over the hard mask layer without substantially damaging the low dielectric constant layer.

Claim 35 (previously added): The method of claim 34, wherein the liquid of the HPLC grade is a form of dimethyl sulfoxide.

Claim 36 (previously added): The method of claim 34, wherein the ultrasonic bath is heated to at least approximately about 50 °C.

Claim 37 (previously added): The method of claim 36, wherein the semiconductor substrate is held in the ultrasonic bath for a period not longer than about 5 minutes.

Claim 38 (previously added): The method of claim 34, wherein the low dielectric constant material has a dielectric constant of approximately about 3.0 or less.